Chapter 1
Introduction

1-1. Purpose

This manual provides guidance for the design of coastal revetments, seawalls, and bulkheads.

1-2. Applicability

This manual applies to HQUSACE elements, major subordinate commands, districts, laboratories, and field operating activities having civil works responsibilities.

1-3. References

Required and related publications are listed in Appendix A. Bibliographic items are cited in the text by author and year of publication, with full references listed in Appendix A. If any reference item contains information conflicting with this manual, provisions of this manual govern.

1-4. Background

Structures are often needed along either bluff or beach shorelines to provide protection from wave action or to retain *in situ* soil or fill. Vertical structures are classified as either seawalls or bulkheads, according to their function, while protective materials laid on slopes are called revetments.

a. Revetments. Revetments are generally constructed of durable stone or other materials that will provide sufficient armoring for protected slopes. They consist of an armor layer, filter layer(s), and toe protection. The armor layer may be a random mass of stone or concrete rubble or a well-ordered array of structural elements that interlock to form a geometric pattern. The filter assures drainage and retention of the underlying soil. Toe protection is needed to provide stability against undermining at the bottom of the structure.

b. Bulkheads and seawalls. The terms *bulkhead* and *seawall* are often used interchangeably. However, a bulkhead is primarily intended to retain or prevent sliding of the land, while protecting the upland area against wave action is of secondary importance. Seawalls, on the other hand, are more massive structures whose primary purpose is interception of waves. Bulkheads may be either cantilevered or anchored (like sheetpiling) or gravity structures (such as rock-filled timber cribs). Their use is limited to those areas where wave action can be resisted by such materials. In areas of intense wave action, massive concrete seawalls are generally required. These may have either vertical, concave, or stepped seaward faces.

c. Disadvantages. Revetments, bulkheads, and seawalls mainly protect only the upland area behind them. All share the disadvantage of being potential wave reflectors that can erode a beach fronting the structure. This problem is most prevalent for vertical structures that are nearly perfect wave reflectors and is progressively less prevalent for curved, stepped, and rough inclined structures that absorb or dissipate increasing amounts of wave energy.

1-5. Discussion

The designer is responsible for developing a suitable solution which is economical and achieves the project's purpose (see EM 1110-2-3300). Caution should be exercised, however, when using this manual for anything beyond preliminary design in which the primary goal is cost estimating and screening of alternatives. Final design of large projects usually requires verification by hydraulic model studies. The construction costs of large projects offer considerable opportunities for refinements and possible cost savings as a result of model studies. Model studies should be conducted for all but small projects where limited budgets control and the consequences of failure are not serious.